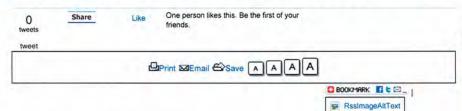






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### An anterior solid zirconia crown

#### Michael DiTolla, DDS, FAGD

For more on this topic, go to www.dentaleconomics.com and search using the following key words: anterior solid zirconia crown, restorations, translucency, Dr. Michael DiTolla.

BruxZir® Solid Zirconia crowns and bridges were originally designed by Glidewell Laboratories for use in the posterior to replace cast gold or metal occlusals when the patient did not want any metal showing in his or her mouth. As dentists began placing BruxZir restorations and were repeatedly satisfied with the results, they are to prescribe BruxZir for bicuspids as well. The lab realized it needed to increase the translucency of this material if dentists wanted to use it in the anterior.

Glidewell's R&D team members worked on this and told me when they were ready to test it. They asked me for an esthetic challenge, so I decided to give them the tough one we all face; the single-unit central incisor crown adjacent to a natural tooth. The photos show the clinical steps for this anterior BruxZir crown. For a crown that is 100% zirconia with no ceramic facing, I think the lab pretty much nailed it.

Figure 1: Tooth No. 9 is to be prepped for a BruxZir Solid Zirconia crown. I chose this case for a couple of reasons. First, tooth No. 8 is a natural tooth, and will be a good test of how the light interacts with the BruxZir restoration versus the natural tooth. Second, tooth No. 7 is an all-ceramic crown, which will be replaced later, and teeth Nos. 10 and 11 are a PFM cantilever bridge. So, we can also compare the BruxZir crown to those two restorations.



Figure 2: At this point, depth cuts are finished: 2 mm at the incisal edge, 1.5 mm at the junction of the incisal and middle thirds, and a 1 mm half-circle reduction at the gingival margin. This lets me fly through the rest of the prep because the gingival is essentially done. The incisal edge takes about 15 seconds, and the facial reduction is marked with a depth cut. There is no guessing about how much to reduce.



Figure 3: At this point, the prep is essentially done. When the top cord is in place, you have a final opportunity to get a great look at the prep. Typically, I spend about 45 seconds polishing the prep, especially the gingival margin. I again turn the handpiece down to 5,000 RPM and the water off, and I use a red-striped fine grit 856-025 bur to give the prep a mirrorlike



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Figure 4: The result of leaving the top cord in for eight to 10 minutes is a sulcus that cannot be missed with an intraoral tip. I am pretty sure I could fling alginate into the sulcus from the other side of the operatory and still get a good impression. When your assistant pulls the top cord, look down from the incisal with a mirror to see what I mean. You will see the impression material flow into the sulcus.



Figure 5: I try in the BruxZir Solid Zirconia crown on tooth No. 9 and find the fit to be acceptable. The patient has approved the esthetics, so we clean it out prior to cementation. I decide to cement the restoration rather than bond it into place because I have sufficient prep length and it is not overtapered. I use RelyX<sup>TM</sup> Luting Plus Cement (3M ESPE; St. Paul, Minn.) because of its natural bond to dentin and simple cleanup. A pinewood stick is used to provide pressure while the cement sets. The inside of the crown is coated with Z-Prime Plus from Bisco to enhance the bond of the cement to the zirconia crown.



Figure 6: This is the final BruxZir Solid Zirconia restoration on tooth No. 9 on the day of cementation. It probably won't be mistaken for a natural tooth, but it blends well with the adjacent natural tooth, tooth No. 8. When I compare it to the existing all-ceramic and PFM crowns in the anterior segment, I think it looks better, although those other crowns are a few years old. While I don't recommend that you jump into prescribing BruxZir for single-unit central incisors, I think BruxZir is one step closer to being a material that is as well suited for anterior restorations as it is for posterior restorations.



Dr. Michael DiTolla is the Director of Clinical Research and Education at Glidewell Laboratories in Newport Beach, Calif. He lectures nationwide on both restorative and cosmetic dentistry. Dr. DiTolla has several free clinical programs available online or on DVD at www.glidewelldental.com.

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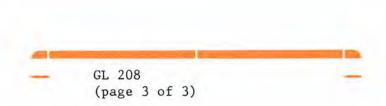
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### Inside Dental Technology

January 2011, Volume 2, Issue 1

### Moving To Monolithic

New price-competitive materials and techniques give laboratories affordable and automated CAM solutions.

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Chip-proof, esthetic, strong, biocompatible, durable, price-competitive—these are just a few of the qualities that have many laboratories turning to full-contour crowns and bridges produced from CAD/CAM-milled monolithic materials. These restorative solutions have no porcelain overlay material to risk sheer or fracture, nor do they require specialized pressing techniques and equipment. They are constructed of solid monolithic zirconia, solid ceramic, or a combination of the two materials fused into a solid structure that can withstand the chewing forces of the posterior regions of the mouth and yet exhibit the esthetic qualities demanded in the anterior. Better yet, they bring laboratories a step closer to full automation and can be sold at a price that is competitive with offshore products.

"I think the ability of manufacturers to provide customers with a material that, when finished, is price-competitive with offshore products makes milling full contour so attractive," says Rita Acquafredda, vice president and general manager of Zahn Dental. The company is now introducing a full-contour solution (www.zahndental.com) that gives dental laboratories two options—they can outsource it to the CMC Milling Center in Arvada, Colorado, by sending their .STL scan files or a model, or they can purchase the material as a milling disc for inhouse production. Any CAD/CAM system that accepts a 100-mm milling disc can mill the material, with each disc producing anywhere from 33 to 44 single crowns. Soon, the discs will also be available in a 98-mm disc size.

Full-contour zirconia restorations first appeared on the market in February 2010 with Glidewell's BruxZir® Solid Zirconia crowns and bridges (www.bruxzir.com). Designed for patients who grind their teeth and typically destroy conventionally processed crowns or bridges, BruxZir restorations claimed indestructibility with their high strength and durability. Now the rest of the market is following suit, with a host of new indications for zirconia and all-ceramic products.

What held the market in limbo for nearly a year were concerns that zirconia had the potential to wear down natural dentition at a much faster rate than conventional indirect materials if it were not treated properly. But it seems those fears have been abated as several manufacturers have or are planning to get into the full-contour zirconia milling game.

"Before we release a new product or new indication, we make sure it will perform to the expectations of the dentists and patients," says Colin Norman, director of Digital Materials at 3M ESPE. Keenly aware of industry concerns about zirconia's abrasiveness to natural dentition, the company extensively tested its newest indication for the market—the Lava™ All Zirconia restoration (www.3MESPE.com). "We ran a battery of in vitro tests before we felt confident enough to release Lava All Zirconia restorations," Norman says. Indicated for milling full-contour single crowns, three- to six-unit bridges, long-span bridges, and cantilever bridges, Lava All Zirconia is a new indication for the existing Lava zirconia milling material.

Acquafredda says tests of highly-polished, full-contour zirconia restorations have suggested they are actually less abrasive than conventional porcelain-fused-to-metal crowns and bridges. 3M ESPE's in vitro tests have shown that the wear characteristics exhibited by polished zironia is surprising low, according to Norman. "It does not cause drastic wear of opposing enamel." he explains.

Unlike glass-based materials, chewing forces have not been found to make zirconia rougher. However, polishing of monolithic zirconia is required. One question that still remains unanswered is what happens to that restoration in the hands of the dentist. If the delivered final crown or bridge requires chairside adjustment, excessive grinding with the wrong instruments could change the bulk properties of the zirconia, leading to strength deterioration.

For laboratory owners whose clients request full-contour zirconia restorations, the anatomically contoured crowns and bridges can be surface-polished using standard polishing burs, followed by a polishing paste such as Zircon-Brite (DVA, Inc, www.dentalventures.com) and a fine-coated diamond bur to achieve the high shine. Norman claims the wear of a



Zahn Dental's full-contour



3M ESPE Lava All Zirconia



Millenium Concept by One Source Dental



Ivoclar Vivadent's IPS e.max CAD-on

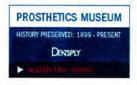


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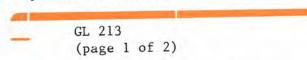
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zirconia restoration is long lasting when a high-shine polish has been applied to its surface.

While there are surely more full-zirconia solutions to come, several are currently available or soon will be, including a new offering from Zahn Dental, 3M ESPE's Lava All-Zirconia, Zenostar® crowns and bridges by Wieland (www.wieland.com), and One Source Dental's Millenium Concept restorations (www.one-sourcedental.com).

#### Fusing All-Ceramic to Zirconia

At next month's Midwinter Meeting in Chicago, Ivoclar Vivadent (www.ivoclarvivadent.com) will launch the IPS e.max CAD-on, a new processing technique that enables dental laboratories to create zirconia-based IPS e.max bridges. This restorative solution will round out the IPS e.max line by offering a definitive esthetic solution for the posterior region that does not require veneering porcelain and is stronger than a pressed overstructure to zirconia.

The substructure is milled from IPS e.max ZirCAD zirconia and the veneering structure is milled from IPS e.max CAD lithium disilicate. "Instead of layering or pressing a feldspathic or fluorapatite glass, which is only about 100 MPa in strength, we now can mill out a much stronger full anatomical lithium disilicate overstructure for the top that is 360 MPa," says Jason Obrokta, marketing manager of All Ceramics at Ivoclar Vivadent. The two halves are fused with Crystall./Connect, a ceramic slurry that bonds the lithium disilicate and zirconia into a strong, solid structure. The company has developed a 40-mm lithium disilicate milling block for the Sirona inLab® MC XL milling unit (www.sirona.com). The newest Sirona software enables expanded applications for IPS e.max CAD and IPS e.max ZirCAD, which can be combined to create up to four-unit bridges.

Obrokta says it takes about 30 minutes to mill a three-unit bridge, depending on morphology, and a single 40-minute firing cycle to simultaneously crystallize the blue state IPS e.max CAD and fuse the ZirCAD framework. "What makes this solution efficient is that you can mill the IPS e.max CAD bridge while you are sintering the IPS e.max ZirCAD framework," Obrokta explains. "This gives laboratories the opportunity to turn around a three- to four-unit bridge in a few hours, if they are using the fast sintering Programat S1."

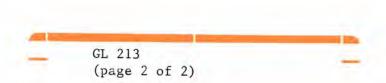
Midwinter attendees will also get the first look at an innovative way to characterize milled fullcontour restorations without applying stains and glaze. Zahn Dental plans to introduce Hilla, a digital transfer "decal" film that fuses to any milled monolithic material to give the crown or bridge the depth of a highly esthetic, multilayered porcelain product. "It is a digital transfer on a printed porcelain film," Acquafredda explains. "The film is applied to the restoration, providing predictable characterization every time. It can be applied to porcelain, zirconia, or any all-ceramic material."

Now all dental laboratories need is to custom digitize each film by integrating the manufacture process with a digital shade device, and the ability to automate the application and fusing process for full automation.

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### Substructures



### Glidewell Dental Lab Introduces BruxZir® Solid Zirconia Crowns and Bridges

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(PRWEB) — Glidewell Dental Lab (http://www.glidewelldental.com), a provider of dental laboratory services, has successfully launched its newest lab service, BruxZir® Solid Zirconia crowns and bridges. This groundbreaking dental product is a full-contour dental zirconia restoration with no porcelain overlay, making it virtually chip-proof.

The strength of BruxZir Solid Zirconia crowns and bridges makes it ideal for bruxers and grinders who have destroyed other dental restorations. Dentists may prescribe BruxZir from Glidewell Dental Lab instead of metal occlusal PFMs and full-cast metal dental restorations. While it is more brawn than beauty, dentists and their patients will be impressed with the esthetics of BruxZir Solid Zirconia when compared with traditional PFMs.

Why choose a monolithic dental restoration like BruxZir Solid Zirconia from your lab? When porcelain is fused to a metal or zirconia substructure, there is always the possibility that the two layers could separate. The best-case scenario is a small chip off the porcelain. The worst-case scenario is that the porcelain completely fractures, exposing the metal or zirconia substructure and requiring replacement. BruxZir is made of one homogenous FDA-registered dental material, zirconia, virtually eliminating the possibility of chipping.

Designed and milled in our lab using CAD/CAM technology, BruxZir Solid Zirconia crowns are sintered for more than 10 hours at 1,530 degrees Celsius, then glazed to a smooth surface. This tough dental restoration has rapidly gained popularity for posterior restorations, when superior strength is required but the patient is reluctant to have unsightly metal in their mouth.

Another great advantage of BruxZir crowns and bridges is that it can be used when dentists must under-reduce for any number of reasons. In these cases, there have been very few options. Previously, the choices would have been limited to a cast-gold crown or a PFM with a metal occlusal. Now, thanks to BruxZir Solid Zirconia, there is a tooth-colored, more esthetic dental option from our lab for cases with limited interocclusal space.

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12/1/2011

## Glidavelb Dental Loads hyroduces ARrunzir & Rollid Zircomia Growns and Bridges Ge Substructor Page 2 1952 #:2011

To complement dentists' work with BruxZir Solid Zirconia restorations, Glidewell Dental Lab's Dr. Michael DiTolla, in partnership with Axis Dental (800-355-5063 or www.axisdental.com), developed the BruxZir® Adjustment & Polishing Set. Due to BruxZir's monolithic nature, it is imperative to use dental burs designed for this unique dental zirconia crown and bridge material. The diamonds and polishers in this set are ideal for adjusting and polishing zirconia, and the diamonds work extremely well in cases in which it is necessary to cut off a dental zirconia crown.

Dentists who are seeking a more esthetic alternative to full-cast gold or metal occlusal PFM's can prescribe their first BruxZir Solid Zirconia crown or bridge restoration by calling our lab at 800-854-7256 to schedule an in-office case pickup. To learn more about the full benefits of BruxZir, visit www.BruxZir.com.

Glidewell Dental Lab is a privately owned corporation that has more than 40 years of history as a provider of high-quality dental restorations to dental practitioners nationwide. It has its own 53-person R&D team and is the most resourceful dental lab in the world. Its newly developed CAD/CAM processing capabilities are recognized as among the most advanced in the lab industry. To view our large selection of clinical videos, CE courses and our products and services, visit Glidewell Dental Lab (http://www.glidewelldental.com).

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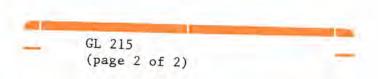
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#### Glidewell Dental Lab Introduces BruxZir® Solid Zirconia Crowns and Bridges

The strength of BruxZir Solid Zirconia crowns and bridges from Glidewell Dental Lab makes it ideal for bruxers and grinders who have destroyed other dental restorations. While BruxZir Solid Zirconia is more brawn than beauty, dentists and their patients will be impressed with the esthetics of this solid dental zirconia when compared with traditional PFMs.

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JUNE 2010, VOLUME 3, ISSUE 6

### **Bonding Agents: Is Convenience Overriding Strength?**

Gordon and Paul's Clinical Bottom Line: The hundreds of articles on "bonding agents" attest to the scientific activity in this area over the past 50 years. The bonds created by etching enamel and placing a liquid resin followed by a conventional resin-based composite are remarkably strong and long lasting. However, clinicians have come to question the usefulness of reported dentin bonds values, knowing from clinical observation that restorative resin can be removed from some dentin-bonded surfaces relatively easily after a period of clinical service. It is well known that dentin bonding agents reduce or eliminate post-operative tooth sensitivity when used properly, and that has become the major reason many dentists use them. The CR scientific and clinical teams offer the following clinically useful, comparative information on currently popular bonding agents.

Bonding agents have been continuously evolving since the 1950s to satisfy the core demands of:

- 1. Adequate bond to enamel and dentin
- 2. Reduction of post-operative tooth sensitivity
- Convenience of use and reduced cost
- 4. Resistance to oral environment
- 5. Biocompatibility

A popular yet controversial method classifies the various bonding agents into "generations" ranging from 1st–7th (with a possible emerging 8th):

- 1st-3rd generations have currently become obsolete.
- 4th and 5th generations (total etch) which use the "etch and rinse" technique are still considered by many to provide the highest bond strengths to enamel.
- 6th and 7th generation (self-etch or "etch and no rinse") claim to provide adequate bond strengths with greater simplification and ease of application leading to faster procedures.

CR researchers and clinicians evaluated 23 bonding agents from 13 companies, encompassing 4th–7th generations and other new products, to determine their bond strengths to dentin and enamel and to compare important clinical characteristics.

The following report provides ansocianical questions; scientific research clinical observations on popular beagents; results from a CR survey or bonding material use; and CR conclusions.

Continued on

EXHIBIT

### **How To Survive a Bad Day at the Office—Disappearing Tooth/Root**

Gordon and Paul's Clinical Bottom Line: If you have not experienced this unfortunate phenomenon, it will surely eventually happen to yo it usually happens at an inopportune time. Often you are accomplishing a routine type of tooth extraction and the tooth or root cannot be



Radiograph of tooth in maxillary sinus

You must determine where the tooth or fragment has gone and decide whether you or someone else remove it. Patients should be tactfully informed about your dilemma without overly frightening Experienced CR Evaluators provide great guidance for you in this article.

The first patient of a very busy, full-scheduled day requires a routine extraction. Anesthesia is complete; to patient is cooperative and comfortable; pressures are applied; and the tooth is delivered minus a root tip segment. The remnant is not visible in the socket and has just disappeared; not a rare experience! We have been there!

This article is full of tips for tip/tooth remnant management strategies for a positive outcome.

See page 4 for how to change distress to success.

Continued on page 4

# First Look: Another Emerging New All-Ceramic Restoration in a Confusing Market

All-ceramic, zirconia-based crowns and fixed prostheses (Cercon, IPS e.max ZirCAD, Everest, Lava) have been available for several years, and research and global clinical experience shows results ranging from excellent to poor. Failures have been reported primarily in the layered external ceramics with minimal fracture of zirconia frameworks. Noritake CZR Press has shown notable success when placed over zirconia substructures (See Clinicians Report November 2008).

Monolithic lithium disilicate, IPS e.max CAD/Press (Ivoclar Vivadent), for single tooth restorations is receiving good research reports and clinical acceptance. More time is needed for further clinical observation. (See Clinicians Report October 2009).

The newest all-ceramic market entry for crowns and fixed prostheses is entirely zirconia without a secondary overlay. The concept was first introduced by Glidewell Laboratories as BruxZir (www.bruxzir.com).

These monolithic, homogeneous restorations are about 3–5 times stronger when tested in-vitro than other monolithic restorations and have been promoted for bruxism



BruxZir all zirconia crowns

and when patients demand esthetic restorations on molars. However, current all-zirconia restorations can be somewhat opaque and monotone. Watch the market expand on the already available 10 or more products. Dentists are actively requesting these restorations from laboratories.

TRAC Research (CR) has a clinical study under way on these restorations and will keep you informed as results come forth. At first look, these restorations appear to be promising for both single and multiple unit restorations. Use caution: only time, research, and clinical observation will validate or condemn them.

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